Land Use Models

For a number of metropolitan planning organizations (MPOs) and other planning agencies aspiring to advance their demographic forecasting process, the means of attaining and implementing enhanced demographic forecasting procedures is not readily apparent. As one e-mail list respondent noted, "…the migration path from DRAM/EMPAL (a widely used land use model) to state of the practice, if not art, is not clear to me". Other e-mail list respondents noted some trepidation in utilizing more advanced land use models even though it may be well documented and not overly complex. These concerns led to discussions on the merit of implementing advanced land use software packages and the investment of resources required to adequately implement land use models. The following is a brief synopsis of contributions to the e-mail list regarding the rationale for implementing advanced land use models, the means of doing so, and some concluding cautionary remarks.

Motivation for Implementing Advanced Models

E-mail list respondents offered several reasons and observations for wanting to implement more sophisticated land use models as well as the practicality of implementing newer models. These reasons included perceived limitations of traditional land use models and the potential benefits derived from implementing newer models.

Respondents cited the following limitations of traditional land use models:

- Inability to provide forecasted data at the traffic analysis zone (TAZ) level. Data is typically furnished at an aggregate level (e.g. county) and is generated by extrapolating current trends,
- Inability to evaluate policies required to achieve optimal land use patterns; these include policies such as smart growth, tax reductions, cost sharing, and land banking, and
- Inability to assess the regional impact of proposed local jurisdiction land use policies.

The following comments were offered as a potential motivation, or improvements that could be realized, by implementing advanced land use models:

- Employs finer geographic detail,
- Includes parcel level data and real estate pricing mechanisms in conjunction with geographic information system (GIS) integrated software,
- Includes feedback procedures between the transportation system and land use,
- Offers increased ability to account for human behavioral traits, and more realistic dynamics,
- Affords improved procedures to account for free market forces that shape new development, and
- Provides ability to incorporate actual land markets.

Means of Implementing Advanced Models

As noted by several contributors, transitioning from traditional land use models to more advanced models can be accomplished through incremental steps or stages. Moreover, the migration process need not merely represent a perfunctory change from one software platform to another platform. The following is a suggested approach for transitioning to a more robust land use model:

- Develop the necessary parcel database using a consistent land use classification to develop a region-wide parcel-based land use inventory,

- Inventory building types, dimensions, and age, if possible, to finalize the parcel database. As one respondent noted, “Many of these sorts of efforts focus too much on the land itself, ignoring the details of the buildings”,
- Use standard data sources,
- Develop a micro-data synthesis from aggregate data, and
- Automate the model calibration process.

The use of local data sources and initially simplifying the land use model as much as possible was also viewed as a useful means of transitioning from traditional models to more advanced models. Having capable staff that thoroughly understand both the intricacies of the land use model as well as local real estate markets was seen by one respondent as being imperative in successfully transitioning to a more advanced land use model.

Similar to other efforts aimed at implementing advanced modeling methodologies, the land use modeling community does not have a standard model or process from which to draw upon. There are currently several different models and methodologies available for application. One e-mail list respondent noted that the modeling community should develop methods for providing, at a minimum, acceptable practice methodologies that are accessible and straightforward. An acceptable practice threshold was defined as a set of models that included feedback from transportation to land use and enough sensitivity to policies such that it made model application advantageous for MPOs. This was viewed as an inception point from which incremental improvements could be implemented over time with the ability to assess each enhancement from a cost benefit perspective. To achieve this however, it was noted that flexible and modular software platforms that allow incremental improvements first need to be developed.

Issues to Consider

One respondent stated that the implementation of advanced models will require a commitment to assemble the necessary data, as well as calibrating and properly applying the model. Other concerns regarding the implementation of advanced models included the following:

- The accuracy and magnitude of advanced model sensitivities,
- The availability of data to support model validation, and
- Whether it is possible to accurately model land use impacts.

Despite these concerns it appears that a number of agencies conclude that the regional planning process will benefit from an integrated land use and transportation model.

Conclusions

There is a strong interest within the modeling community to move forward and begin implementing more sophisticated land use models that may have the capability to more accurately depict the potential impacts of policy-level decisions. The current perception is traditional land use models have limited capabilities and are not sensitive to locally proposed policy initiatives. In response to concerns regarding the efficacy of transitioning to more advanced land use models, several respondents outlined a variety of steps that can facilitate the actual transition. Final considerations for those planning to implement more advanced land use models include the decision whether to use open source or commercial vendor software, the process for choosing appropriate software, whether to customize the software and to assess the trade-offs of being an early adopter of advanced methodologies.

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